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BRIEF REPORT

Posttraumatic Stress Disorder in Disaster Relief Workers Following Direct and Indirect Trauma Exposure to Ground Zero

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The present study compared rates of posttraumatic stress disorder (PTSD) in relief workers at the World Trade Center collapse from two sources: direct exposure to the disaster site and indirect exposure through survivor narratives. Standardized clinical interviews for PTSD were conducted with 109 relief workers 6–8 months after the September 11th terrorist attacks. Rates of acute PTSD from direct and indirect exposure to traumatic stressors were 6.4% and 4.6%, respectively. The findings suggest that indirect exposures can lead to PTSD even when Criterion A1 of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition-Text Revision *(*DSM-IV-TR*; American Psychiatric Association, 2000, p. 463), i.e., "experienced by a family member or other close associate" is not met. Further research is necessary to define precisely the parameters of indirect traumatic exposure that may be linked to the development of PTSD.*

The *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition-Text Revision* (*DSM-IV-TR*; American Psychiatric Association [APA], 2000) stressor criterion, Criterion A for posttraumatic stress disorder (PTSD) requires either direct exposure to a trauma involving self or others, or indirect exposure to trauma for the diagnosis to be assigned. Direct exposure to a trauma implies a first-order exposure to the traumatic stressor (i.e., experiencing or witnessing). In contrast, the definition of indirect exposure to trauma involves "learning about unexpected or violent death, serious harm, or threat of death or injury experienced by a family member or other close associate" (APA, 2000, p. 463).

Research with survivors of the terrorist attacks on September 11, 2001 in New York and Washington (9/11) has documented PTSD following both direct and

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indirect exposure to the disaster. For example, individuals who were directly exposed to the terrorist attacks manifested PTSD at a rate of 20% (Galea et al., 2002; Schlenger et al., 2002). Posttraumatic stress disorder was also documented in individuals who were indirectly exposed to trauma that did not directly involve a family member or other close person. For example, PTSD related to the terrorist attacks was found in 4% of individuals living outside of the attack sites who were indirectly exposed to the tragedies via television (Schlenger et al., 2002). However, despite these prevalence rates, PTSD that occurs subsequent to indirect exposure to trauma (secondary traumatization) is understudied (Zimering, Munroe, & Gulliver, 2004).

The objective of the present study was to assess rates of PTSD associated with direct and indirect trauma exposure at Ground Zero in relief workers using standardized clinical interview methodology. As part of the nation's response to the World Trade Center (WTC) attacks, relief workers from outside of New York and Washington, DC traveled to assist firefighters and firefighter family survivors. These workers received direct exposure to Criterion A traumas at the disaster site and indirect exposure to trauma via survivor accounts of the terrorist attacks. Given the prevalence rates found in the studies cited above, we hypothesized that (a) PTSD rates from direct exposure would exceed rates of PTSD from indirect exposure, and (b) PTSD from indirect exposure would result from events that do not involve family members or close associates.

METHOD

Participants

The sample consisted of 109 mental health relief workers (93 men and 16 women) recruited from a pool of Critical Incident Stress Management (CISM) teams within the International Association of Firefighters (IAFF). Participants were deployed to Ground Zero for one week within the first 2 months following the 9/11 attacks. The mean age of workers was 44.1 years ($SD = 9.26$), 93% were employed fulltime, and 84% of the sample was married. The majority of the study sample was White (88.5%).

Professional disciplines included firefighter peer counselors ($n = 73$), social workers ($n = 6$), psychologists ($n = 4$), psychiatric nurses ($n = 3$), and clergy members ($n = 23$). All participants provided signed informed consent for participation in the study that was approved by the Boston University School of Medicine Institutional Review Board.

Procedure

Relief workers were recruited by letter and those interested in participating returned postcards (response rate = 90%). A single assessment session was scheduled to conduct a structured PTSD diagnostic interview with the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995) and standardized psychological questionnaires 6–8 months after 9/11. Five licensed psychologists, trained to CAPS criteria, conducted the interviews, and administered the questionnaires. Separate PTSD interviews were conducted for each direct and indirect traumatic exposure reported by participants. Direct traumatic exposure was defined as someone who "experienced, witnessed, or was confronted with an event or events involved actual or threatened death or serious injury" (APA, 2000, p. 467). Indirect traumatic exposure was defined as knowledge of an event through a first person account of actual or threatened death or serious injury (irrespective of the relationship to the survivor).

The current study sample could be considered at risk for occupational-related trauma exposure and PTSD stemming from prior pre-9/11 exposure. Therefore, to increase accurate assessment of PTSD symptoms related to direct and indirect 9/11 traumatic exposure, a Life Events Checklist (LEC) for potentially traumatic events (PTE) pre and post 9/11 was administered to all participants. When exposure to a PTE was endorsed on the LEC, a follow-up PTSD Criterion A2 interview was conducted for each PTE. Participants also completed self-report questionnaires that assessed symptoms of PTSD, depression, anxiety, and functioning. Participants received $20 following completion of the interview and questionnaires.

Measures

The Clinician-Administered PTSD Scale (Blake et al., 1995) was used as the primary PTSD diagnostic measure. Posttraumatic stress disorder symptoms were scored using the CAPS 1–2 scoring rule (i.e., clinical threshold was set as a minimum frequency score of 1 and a minimum intensity score of 2). A review of the CAPS' psychometric properties showed it to have excellent reliability and strong convergent and discriminant validity (Weathers, Keane, & Davidson, 2001).

The CAPS interviews were conducted with all relief workers who reported indirect exposure to 9/11 trauma via a survivor's account ($N = 109$). In addition, a CAPS interview for PTSD based on direct Ground Zero exposure was conducted with a subsample of the 109 participants ($n = 41$) who met both Criterion A1 and A2 requirements. In an attempt to minimize confounding of PTSD symptom reports in workers who were exposed to both direct and indirect trauma, the interviewer linked the inquiry of symptoms to the specific direct or indirect trauma exposure. This was accomplished by citing the specific 9/11 traumatic exposure at the end of each symptom interview question (e.g. "Have you ever tried to avoid thoughts or feelings about [insert 9/11 indirect or direct traumatic exposure]").

The Life Events Checklist (Blake et al., 1995) is a brief inventory administered before the CAPS interview to establish PTSD Criterion A1 events. Participants rated 17 potentially traumatic events on a 5 item checklist ("happened to me," "witnessed it," "heard/learned about it," "not sure," or "doesn't apply").

The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) is a 21-item self-report questionnaire that measures emotional, cognitive, and behavioral depressive symptomatology. Internal consistency for the BDI ranges from .73 to .92 with a mean of .86. (Beck, Steer, & Garbin, 1988).

The Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988) is a 21-item self-report questionnaire evaluating the subjective, somatic, and panic-related symptoms of anxiety. Analyses indicate satisfactory reliability and validity, Cronbach's $\alpha = .92$ (Beck et al., 1988).

The Subjective Symptoms Scale (SSS; Hafner & Marks, 1976) is a 5-item scale consisting of an 8-point ratings scale evaluating the extent to which symptoms interfere with five areas of life functioning: work, home management, private leisure, social leisure, and family relationships. Total scores on the SSS range from 0 to 40, with higher scores indicating more interference. Analyses of item correlations and internal consistency indicate that the items fall into a single scale, Cronbach's $\alpha = .83$ (Brown, Antony, & Barlow, 1995).

RESULTS

On the Life Events Checklist, 86 of the 109 respondents reported a PTE pre-9/11 and 34 respondents reported a PTE post-9/11. Approximately 35% (30) met PTSD Criterion A for pre-9/11 events and none met Criterion A for post-9/11 events (i.e., events unrelated to Ground Zero work).

Five of the 109 relief workers (4.6%) met *DSM-IV-TR* criteria for acute PTSD (symptom duration less than 3 months) linked to survivor narratives, and 7 of the 109 relief workers (6.4%) met criteria for acute PTSD associated with direct exposure to traumatic stressors at Ground Zero. At the time of the study interview, 6–8 months after 9/11, symptoms had resolved to the point that none of the workers met full criteria for current PTSD. These findings are consistent with our hypothesis that rates of PTSD would be greater in those relief workers who were directly exposed to trauma.

Importantly, none of the participants in either PTSD positive group reported 9/11-related death or injury to a family member or close friend. This finding supports the notion that PTSD from indirect exposure can occur in the absence of a personal connection to the victim. No relief worker met criteria for PTSD from dual exposure to a survivor narrative and a Ground Zero trauma. Scores on the self-report indices of mental health symptoms and functioning fell within the nonclinical range even if participants had met criteria for PTSD following their 9/11 service (see Table 1).

Table 1. Means and Standard Deviations of Self-Report Measures of Mood and Functioning ($N = 109$)

	Full sample ($n = 95$)[a]		PTSD DE ($n = 6$)[a]		PTSD IE ($n = 4$)[a]	
	M	*SD*	*M*	*SD*	*M*	*SD*
BDI	4.0	4.6	4.3	4.0	3.3	2.3
BAI	2.3	4.3	2.3	2.4	0.7	1.2
SSS	2.4	4.8	1.7	2.6	5.0	7.5

Note. PTSD = Posttraumatic stress disorder; DE = direct exposure; IE = indirect exposure; BDI = Beck Depression Inventory (Beck et al., 1988); BAI = Beck Anxiety Inventory (Beck et al., 1988); SSS = Subjective Symptoms Scale (Hafner & Marks, 1976).

[a]Fourteen participants in the full sample, one participant in the PTSD DE group and one participant in the PTSD IE group did not complete the questionnaires.

DISCUSSION

Results from this study are consistent with past findings showing that PTSD can develop following indirect exposure to the 9/11 tragedies, and that the PTSD Criterion A stressor need not involve a family member or close associate (Schlenger et al., 2002). The present findings are noteworthy because we found PTSD from indirect exposure to trauma in individuals whose occupations involve high-risk duties and who display resilience in the face of such exposure. The finding that 4.6% of trained relief workers met criteria for PTSD linked to indirect traumatic exposure is comparable to the 4% rate of PTSD in individuals living outside of the terrorist attack sites who were exposed to the trauma via television. Both studies suggest that exposure to indirect sources may have a role in PTSD symptom development.

Limitations of the study include a possible confound in the assignment of 9/11-related PTSD diagnoses in a sample with high rates of pre- and post-9/11 occupational traumatic exposures. However, the immediacy of the disaster response precluded a predeployment PTSD assessment of relief workers. Thus, we cannot be completely assured that pre-existing PTSD is not confounding our results. Nonetheless, our confidence in the validity of our results is bolstered by multiple factors. First, although pre-9/11 Criterion A1 and A2 experiences were common in this sample, comparable reports of non-WTC, post-9/11 Criterion A1 and A2 exposures were nonexistent. Second, at the time of the interview, neither current PTSD, depression, or anxiety symptom elevations, nor functional impairment was present in either the PTSD positive or PTSD negative group. This finding suggests that pre-9/11 chronic PTSD was not likely in this sample because exposure to 9/11 would not be expected to resolve existing PTSD. Finally, the study sample was comprised of CISM team members who were physically and psychologically cleared for duty by local CISM directors before deployment as well as by a licensed clinical psychologist (the IAFF Director of Counseling and Critical Incident Stress Debriefing) once they arrived at the WTC. However, these same factors limit generalizability of the current findings to a broader population of relief workers.

In addition, participants were exposed to both indirect and direct trauma at the WTC. In this convenience sample, control over the type of traumatic exposure at the disaster site was not possible. However, we did employ separate standardized clinical interviews in an attempt to differentiate symptoms from direct and indirect exposure. Further, we found that the relief workers who were PTSD positive in response to indirect exposure constituted a separate diagnostic group from those who had PTSD as a result of direct exposure.

Finally, this study relied on retrospective reporting, which could be problematic in a population with multiple exposures prior to and following 9/11. However, recent research suggests more consistent retrospective reporting of traumatic events in populations with multiple exposures such as those in the present study (Bramsen, Dirkzwager, Van Esch, & van der Ploeg, 2001; Krinsley, Gallagher, Weathers, Kutter, & Kaloupek, 2003).

CONCLUSION

In conclusion, findings from the present study suggest that indirect exposure may be a potent factor leading to the development of PTSD in some people. More research is needed regarding PTSD symptoms that manifest following

indirect exposure to trauma and the characteristics of individuals who do not develop PTSD symptoms after indirect exposure. Our findings, that PTSD from indirect exposure did not involve a family member or close friend, suggest that Criterion A1 definitions of traumatic exposure require further examination and precision. Future research may increase our understanding of the features of indirect exposures that lead to PTSD (cf. Breslau & Kessler, 2004) and may inform primary prevention of PTSD from indirect traumatic experiences.

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